TNZ P/26 NOTES: 2003

NOTES TO THE SPECIFICATION FOR IMPROVEMENT OF PAVEMENT MACROTEXTURE

(These notes are for the guidance of Transit New Zealand's staff and consultants, and must not be included in the contract documents.)

1. SCOPE

These notes accompany the TNZ P/26 Specification. They apply to the use of high-pressure water and grooving to improve the macrotexture of pavement surfacings.

The specification refers to grooving, rather than saw cutting, as saw cutting can be used for numerous purposes including grooving. It also refers to water blasting equipment as "High Pressure Water", to avoid the waterblaster/watercutter debate.

2. AIM

Maximum wet road skid resistance is achieved at 20 km/hr. Skid resistance drops off with increasing speed and increasing depth of water film. Increasing macrotexture reduces the rate of this drop off.

3. USE

Grooving is being used mainly to improve the macrotexture on existing hotmix asphalt surfacings that do not meet the TNZ texture requirements. As the TNZ texture requirements are met through the use of appropriate mixes then it is expected that the need for the use of grooving to improve macrotexture will decrease.

On open grade mixes e.g. TNZ P/11 OGPA it would not be expected that grooving would be necessary, as the macrotexture of a clogged OGPA would be expected to be within the TNZ texture requirements. It would also not normally be used on chipseals as high-pressure water could achieve a similar result.

High-Pressure water is used on flushed chipseals and has replaced the pavement burner in most areas of New Zealand as a method to increase the macrotexture.

4. HIGH PRESSURE WATER

4.1 Equipment

High-pressure water equipment and grooving equipment must incorporate a collection system to uplift the removed detritus, at the time of operation, from the road surface. The system must be totally self-contained to ensure that detritus does not get spread over the pavement surface. This requirement also helps to ensure that all material is disposed of at an appropriate site.
Two techniques are being used in NZ termed Water blasting and Watercutting. Both comprise of a truck mounted pump, water supply and vacuum recovery system and a system that directs the water jets at the road surface. To avoid any debate on the terminology the terms high-pressure water have been used.

The water blasting system uses a water pressure of approximately 15000psi where watercutting uses pressure up to 36000 psi. With watercutting the volume of water may be less.

Water cutting is claimed to be more effective in restoring microtexture than water blasting. The life of any improvement in microtexture is the subject of a Transfund research project. Both techniques are capable of restoring macrotexture on a chipseal although polymer modified binders may make achievement of specified results more difficult.

4.2 End Result Texture

A sand circle of about 170 to 180 mm has been reported nation-wide following high-pressure water treatments, regardless of the underlying surfacing. Hence, a required macrotexture of a maximum 200 mm sand circle (1.1 mm MPD minimum) has been specified in P/26. If the resulting texture depth was below 1.1 MPD then the treatment is unlikely to be cost effective on open roads where the TNZ texture requirement is for a minimum of 0.9MPD.

The above texture levels have been obtained on normal seals they would not be expected to be obtained on surfaces such as a Grade 6 void fill or if the technique was used on hot mix asphalt.

As more information is gathered about this treatment then the specified texture limits may need to be modified. The Consultant should seek advise from the contractor or from other regions to determine if the specified limits are appropriate when surfaces other than normal reseals are being treated.

The specification calls for a visual assessment of the surface to ensure it is consistent and clean. The texture requirement is specified to assist in "calibrating" the eye and giving some data that can be used in updating criteria and assisting in estimating the life of the treatment. Provision is made for the contractor to inspect the site and where it is agreed that the acceptance criteria needs modifying then this can be agreed with the Engineer.

4.3 Expected Performance

The life that can be obtained from the treatment is dependent on the reason for the flushing. If flushing has been caused by over application of binder then it is possible to obtain a relatively long life. If however flushing is associated with a build up of seal layers then the life may be less than the previous reseal.

At this stage of the development of the technique it appears that a sand circle derived texture depth of approximately 1.2mm is achievable on most chipseal surfaces. It is important at this stage in the development of the technique for New Zealand conditions that data is gathered on texture depth achieved and the life of the treatment.

5. GROOVING

This involves cutting parallel grooves in the road surface with a saw blade. These grooves can be either longitudinal or transverse to the road direction.

Grooving may lead to increased tyre/road noise. Transverse grooves will increase noise more than longitudinal grooves. Randomly spaced transverse grooves may reduce noise.

A suggested grooving pattern (6 mm wide, 6 mm deep, spacing of 38 mm, to a pattern as specified) has been specified in P/26 as it has been typically used in New Zealand. Other width, depth, spacing and patterns can be specified based on the available equipment and experience in the area. Narrower grooves at closer spacing or randomly spaced grooves may help to reduce the tyre noise generated by the grooving treatment.

Cutting the groove gives some spalling around the edges that may help to improve the SCRIM value without necessarily commensurate skid resistance benefits to road vehicles. It improves the macrotexture as it enhances drainage. In this regard transverse cuts are regarded as more effective than longitudinal in draining water to the road edge.

Longitudinal grooves would be placed around a curve for cornering stability while transverse grooves would be made at an intersection where braking will be common. Care needs to be exercised to ensure that water runoff across the grooves is not excessive and the water does not pond and become a hazard. To assist in water drainage across the pavement transverse grooves at appropriate intervals have been used.

The needs of cyclists and motorcyclists should be considered if in doubt expert assistance should be sought.

5.1 New Zealand Experience

Saw cutting has been used to a limited extent in both the Auckland and Wellington areas for over 20 years. It has a long history of use on runways. Over the last few years it has been used more extensively throughout the country on dense graded hot mix. It should not be used on OGPA or chipseall unless texture is very low (below the threashold level) and the use is economic for the expected life. Grooving on OGPA and chipseal surfaces gives variable

results and premature disintegration of the surfaces can occur.

5.2 Advantages of Grooving

- Effective for improving texture on dense asphaltic concrete.
- Improves the macrotexture and thus reduces the progressive loss of skid resistance with increasing speed.
- The treatment generates much more tyre noise than untreated surfaces, and this may be seen as an advantage in some situations in that it could give a warning that the area is hazardous.

5.3 Constraints of Grooving

- The increased noise is usually regarded as a disadvantage both for the motorist and for the adjacent population.
- The longitudinal cuts may lead to wheel tracking for bicycles.
- Transverse cuts can be difficult to carry out because of the space constraints for machinery at the road edges and the need to close the road.
- The process is noisy.

5.4 Expected Performance

On older asphaltic concrete saw cutting can last a number of years while on new mixes it can close up within one year.

The technique is useful for increasing macrotexture.

6. PERIOD OF DEFECTS LIABILITY

A defects liability period for the use of high-pressure water has been included. It is considered that areas where excess binder has been removed will exhibit chiploss within one month. Isolated areas of chiploss might not be able to be avoided but areas greater than 0.5m of wheelpath length should be repaired. The Engineer should approve any methods proposed by the contractor for repair of these areas.